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| This Class 502 is considered to be an integral part of Class 252 (see the Class 252 schedule for the position of this Class in schedule hierarchy). This Class retains all pertinent definitions and class lines of Class 252. | | 28 | ...Organic |
| | | 29 | ..Organic liquid |
| | | 30 | ...And gas addition thereto |
| | | 31 | ...Hydrocarbon |
| | | 32 | ...Halogen containing |
| | | 33 | ...Oxygen containing |
| | | 34 | .Gas or vapor treating |
| | | 35 | ..Using halogen containing substance including liquids vaporizable upon contacting spent catalyst or sorbent |
| 1 | HAVING FOREIGN OR DIVERSE FUNCTION (E.G., PREVENT CORROSION, ETC.) | 36 | ...Fluorine containing |
| 2 | .With structure having utility in addition to support or carrier | 37 | ...Simultaneously or subsequently adding free oxygen or use of oxyhalogen compound |
| 3 | TO BE USED AS A MELT | 38 | ..Treating with free oxygen containing gas |
| 4 | IN FORM OF A MEMBRANE | 39 | ...And forming useful by-product |
| 5 | IRRADIATION BY, OR APPLICATION OF, ELECTRICAL, MAGNETIC OR WAVE ENERGY | 40 | ...And adding heat by admixing solid heat carrier |
| 6 | CONTROL RESPONSIVE TO SENSED CONDITION | 41 | ...In gaseous suspension (e.g., fluidized bed, etc.) |
| 7 | BIOSPECIFIC MATERIAL, OR PRODUCED BY ENZYME OR MICROORGANISM | 42 | ...And substantially complete oxidation of carbon monoxide to carbon dioxide within regeneration zone |
| 8 | FORMING OR TREATING A SPHERE, PROCESS ONLY | 43 |Plural distinct serial combustion stages |
| 9 | .Forming other than by liquid immersion | 44 |Indirectly heating or cooling spent material within regeneration zone or prior to entry into regeneration zone |
| 10 | .Treating preformed sphere only | 45 | ...Moving bed (e.g., vertically or horizontally, etc., moving bulk material) |
| 11 | INCLUDING ION EXCHANGING, EXCEPT ZEOLITES OR PRODUCT THEREOF | 46 | ...Generally concurrent flow of oxygen containing gas and material |
| 12 | .For regenerating or rehabilitating catalyst or sorbent | 47 | ...Generally countercurrent flow of oxygen containing gas and material |
| 20 | REGENERATING OR REHABILITATING CATALYST OR SORBENT | 48 | ...Generally transverse (i.e., lateral) flow of oxygen containing gas relative to material |
| 21 | .Including segregation of diverse particles | 49 | ...Plural distinct oxidation stages |
| 22 | .Treating with a liquid or treating in a liquid phase, including dissolved or suspended | 50 | ...Reactive gas treating after oxidation |
| 23 | .. "Wet air combustion" oxidation of material submerged in liquid | 51 | ...Oxidation gas comprises essentially steam and oxygen |
| 24 | ..Including intended dissolution or precipitation of a substantial amount of an ingredient of the ultimate composition | 52 | ...With control of oxygen content in oxidation gas |
| 25 | ..Using salt or alkaline substance | 53 | ..Elemental hydrogen |
| 26 | ...Ammonia or derivative thereof | | |
| 27 | ..Using acid | | |

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|-----|---------------------------------------|-----|-----------------------------------|
| 54 | ..Ammonia or derivative thereof | 102 | .Plural component system |
| 55 | ..Steam | | comprising A - Group I to IV |
| 56 | .By heat | | metal hydride or |
| 60 | ZEOLITE OR CLAY, INCLUDING | | organometallic compound - and |
| | GALLIUM ANALOGS | | B - Group IV to VIII metal, |
| 61 | .Gallium containing | | lanthanide or actinide compound |
| 62 | .Including organic component | | - (i.e., alkali metal, Ag, Au, |
| 63 | .And additional AL or Si | | Cu, alkaline earth metal, Be, |
| | containing component | | Mg, Zn, Cd, Hg, Sc, Y, Al, Ga, |
| 64 | ..Zeolite | | In, Tl, Ti, Zn, Hf, Ge, Sn or |
| 65 | ...And rare earth metal (Sc, Y or | | Pb hydride or organometallic |
| | Lanthanide)containing | | compound and Ti, Zr, Hf, Ge, |
| 66 | ...And Group VIII (Iron Group or | | Sn, Pb, V, Nb, Ta, As, Sb, Bi, |
| | Platinum Group) metal | | Cr, Mo, W, Po, Mn, Tc, Re, Iron |
| | containing | | group, Platinum group, atomic |
| 67 | ...Mixed zeolites | | number 57 to 71 inclusive or |
| 68 | ...Mixed with clay | | atomic number 89 or higher |
| 69 | ...Heterogeneous arrangement | | compound) |
| 70 | ...Gelling in presence of zeolite | 103 | ..Component A metal is Group IA, |
| 71 | ...ZSM Type | | IIA or IIIA and component B |
| 72 | ..Mixed clays | | metal is Group IVB to VIIB or |
| 73 | .And Group III or rare earth | | VIII (i.e., alkali metal, |
| | metal (Al, Ga, In, Tl, Sc, Y) | | alkaline earth Metal, Be, Mg, |
| | or Lanthanide containing | | Al, Ga, In or Tl and Ti, Zr, |
| 74 | .And Group VIII (Iron Group or | | Hf, V, Nb, Ta, Cr, Mo, W, Mn, |
| | Platinum Group) containing | | Tc, Re, iron Group or Platinum |
| 75 | .Including chemical reduction of | | group) (e.g., Ziegler |
| | exchanged cation | 104 | Catalyst, etc.) |
| 76 | .Coprecipitation | | ...Preparing catalyst or |
| 77 | .ZSM type | 105 | precursor |
| 78 | .Mordenite type | |Including comminuting (e.g., |
| 79 | .Faujasite type (e.g., X or Y, | 106 | milling, grinding, etc.) |
| | etc.) | 107 |Fluidized bed feature |
| 80 | .Clay | |Including heating to higher |
| 81 | ..Acid treating | 108 | temperature |
| 82 | ...Plural acid treatment | |Utilizing hydrocarbon |
| 83 | ...Sulfuric or hydrochloric acid | | containing unsaturation not |
| 84 | ..And metal, metal oxide, or | 109 | part of benzene ring |
| | metal hydroxide | |Utilizing high molecular |
| 85 | .Activating treatment | 110 | weight synthetic polymer |
| 86 | ..Utilizing ammonium ions | |Including plural additions of |
| 87 | .Support per se | 111 | Component A |
| 100 | CATALYST OR PRECURSOR THEREFOR | 112 |Utilizing water or compound |
| 101 | .Making catalytic electrode, | | containing hydroxy bonded to |
| | process only | 113 | carbon |
| | | 114 | ...Containing iodine |
| | | | ...Containing two or more |
| | | | different Component B metals |
| | | 115 | ...Containing hydrides or |
| | | | organometallic of two or more |
| | | | different Component A metals |
| | | 116 |Magnesium containing |
| | | |And compound containing |
| | | | Silicon-Hydrogen or Silicon- |
| | | | Carbon bond |

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| 117 | ...Component B metal is other than titanium or vanadium | 155 | ...Including phosphorus or sulfur or compound containing nitrogen or phosphorus or sulfur |
| 118 | ...And a third component C (i.e., an additive other than a saturated hydrocarbon or an aromatic hydrocarbon free of aliphatic or cycloaliphatic unsaturation) | 156 | ...Including alcohol, phenol, or ether |
| 119 |Non-metallic inorganic halogen containing | 157 | ...Alkali metal bonded to carbon |
| 120 |Elemental oxygen or nonmetallic inorganic oxygen-containing material, other than water | 158 | ..Compound with Silicon-hydrogen bond or organic compound with silicon-carbon bond |
| 121 |Nonmetallic organic phosphorus containing | 159 | ..Resin, natural or synthetic, polysaccharide or polypeptide |
| 122 |Nonmetallic organic sulfur containing | 160 | ..Peroxygen compound containing |
| 123 |Nonmetallic organic nitrogen containing | 161 | ..With metal carbonyl or carbon monoxide complex |
| 124 |Including element in addition to carbon, hydrogen, and nitrogen (e.g, nitro, etc.) | 162 | ..Organic phosphorus or nitrogen, except the ammonium ion |
| 125 |Nonmetallic organic oxygen containing | 163 | ...Phthalocyanine |
| 126 |Ether | 164 | ...Quaternary ammonium or phosphonium |
| 127 |Ester | 165 | ...Copper containing |
| 128 |Nonmetallic organic halide | 166 | ...Rhodium containing |
| 129 |Metal compound other than which could be produced in situ by reaction of a Group IA, IIA, or Group IIIA metal compound present with a titanium or vanadium compound present | 167 | ...Organic nitrogen containing |
| 130 |Lead compound | 168 | ..Organic sulfur compound |
| 131 |Tin compound | 169 | ..With metal halide |
| 132 |Aluminum compound | 170 | ..With metal carboxylate or metal compound and carboxylic acid or anhydride |
| 133 |Magnesium compound | 171 | ..Organic compound contains metal (e.g., Na-O-Ethyl, etc.) |
| 134 |Halogen containing | 172 | ..Alcohol, phenol, ether, aldehyde or ketone |
| 150 | .Organic compound containing | 173 | ..Elemental metal in organic dispersing medium |
| 151 | ..Method of making including comminuting of solid material (e.g., grinding, crushing, etc.) | 174 | .Inorganic carbon containing |
| 152 | ..Organic compound including carbon-metal bond | 175 | ..Cyanide |
| 153 | ...Diverse metals bonded to carbon | 176 | ..Hydroxycarbonate |
| 154 | ...Including metal compound containing different metal than that bonded to carbon | 177 | ..Carbide |
| | | 178 | ...Silicon carbide |
| | | 179 |Group VA (N, P, As, Sb, Bi) containing |
| | | 180 | ..Elemental carbon |
| | | 181 | ...And halogen containing |
| | | 182 | ...And metal, metal oxide, or metal hydroxide |
| | | 183 |Of Group II (i.e., alkaline earth, Be, Mg, Zn, Cd or Hg) |
| | | 184 |Of Group I (i.e., alkali, Ag, Au or Cu) |
| | | 185 |Of Group VIII (i.e., iron or platinum group) |
| | | 200 | .Nitrogen compound containing |
| | | 201 | ..Nitrate |
| | | 202 | .Boron or compound containing same |

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| 203 | ..Boron halide | 235 |Group III or rare earth metal, metal oxide, or metal hydroxide containing (i.e., Sc, Y, Al, Ga, In, Tl or lanthanide) |
| 204 | ..And Group VI metal containing (i.e., Cr, Mo, W or Po) | | |
| 205 | ...And bismuth containing | | |
| 206 | ...Molybdenum containing | | |
| 207 | ..And Group VIII metal containing (i.e., iron or platinum group) | 236 |Group IV metal, metal oxide, or metal hydroxide, (i.e., Ti, Zr, Hf, Ge, Sn or Pb) |
| 208 | .Phosphorus or compound containing same | 237 | ...Metal, metal oxide, or metal hydroxide containing |
| 209 | ..And vanadium containing | | |
| 210 | ..And Group VI metal (i.e., Cr, Mo, W or Po,) | 238 |Of Group III metal (i.e., Sc, Y, Al, Ga, In or Tl) |
| 211 | ...Molybdenum | 239 |Of Group IV metal (i.e., Ti, Zr, Hf, Ge, Sn or Pb) |
| 212 |And bismuth containing | | |
| 213 | ..And Group VIII metal containing (i.e., iron or platinum group) | 240 | ..With metal, metal oxide, or metal hydroxide |
| 214 | ..And silicon containing | 241 | ...Of Group VII (i.e., Mn, Tc or Re) |
| 215 | .Selenium or tellurium or compound containing same | 242 | ...Of Group IV (i.e., Ti, Zr, Hf, Ge, Sn or Pb) |
| 216 | .Sulfur or compound containing same | 243 | ...Of Group I (i.e., Alkali, Ag, Au or Cu) |
| 217 | ..Sulfate | | |
| 218 | ...And Group I metal containing (i.e., alkali, Ag, Au or Cu) | 244 |Of copper |
| 219 | ..And Group VI metal containing (i.e., Cr, Mo, W or Po) | 245 |And group VIII metal containing (i.e., iron or platinum group) |
| 220 | ...Molybdenum containing | 246 | ...Of Group V (i.e., V, Nb, Ta, As, Sb or Bi) |
| 221 | ...And Group VIII metal containing (i.e., iron or platinum group) | 247 |Of vanadium |
| 222 | ..And Group VIII metal containing (i.e., iron or platinum group) | 248 |And Group VI metal (i.e., Cr, Mo., W or Po) |
| 223 | ...Platinum group (i.e., Ru, Rh, Pd, Os, Ir, Pt) | 249 |Of antimony or bismuth |
| 224 | .Halogen or compound containing same | 250 | ...Of Group II (i.e., alkaline earth, Be, Mg, Zn, Cd or Hg) |
| 225 | ..Copper halide | 251 |Magnesium |
| 226 | ..And Group II metal (i.e., alkaline earth, Be, Mg, Zn Cd or Hg) | 252 |And Group VIII metal containing (i.e., iron or platinum group) |
| 227 | ..And Group IV metal (i.e., Ti, Zr, Hf, Ge, Sn or Pb) | 253 |Of zinc, cadmium, or mercury |
| 228 | ..And Group VI metal (i.e., Cr, Mo, W or Po) | 254 | ...Of Group VI (i.e., Cr, Mo, W or Po) |
| 229 | ..And Group VIII metal (i.e., iron or platinum group) | 255 |Molybdenum |
| 230 | ...Platinum group (i.e., Ru, Rh, Pd, Os, Ir or Pt) | 256 |Chromium |
| 231 | ..And Group III metal (i.e., Sc, Y, Al, Ga, In or Tl) | 257 |And Group VIII metal containing (i.e., iron or platinum group) |
| 232 | .Silicon containing or process of making | 258 | ...Of Group VIII (i.e., iron or platinum group) |
| 233 | ..Forming silica gel | 259 |Nickel |
| 234 | ...Coprecipitating | 260 |Cobalt |
| | | 261 |Platinum group (i.e., Ru, Rh, Pd, Os, Ir or Pt) |
| | | 262 |Platinum or palladium |

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| 263 | ...Of Group III or lanthanide group (i.e., Sc, Y, Al, Ga, In, Tl, or atomic number 57 to 71 inclusive) | 327 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 300 | ..Metal, metal oxide or metal hydroxide | 328 | ...And Group II metal containing (i.e., alkaline earth, Be, Mg, Zn, Cd or Hg) |
| 301 | ..Raney type | 329 |Zinc containing |
| 302 | ..Of lanthanide series (i.e., atomic number 57 to 71 inclusive) | 330 | ...And Group I metal containing (i.e., alkali, Ag, Au or Cu) |
| 303 | ...Lanthanum | 331 |Copper containing |
| 304 | ...Cerium | 332 | ...And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 305 | ..Of Group VI (i.e., Cr, Mo, W or Po) | 333 |Of palladium |
| 306 | ...And Group II metal containing (i.e., alkaline earth, Be, Mg, Zn, Cd or Hg) | 334 |Of platinum |
| 307 |Zinc | 335 |Of nickel |
| 308 | ...And Group IV metal containing (i.e., Ti, Zr, Hf, Ge, Sn or Pb) | 336 |Of iron |
| 309 |Titanium containing | 337 | ...Of nickel |
| 310 |Tin containing | 338 | ...Of iron |
| 311 | ...And Group V metal containing (i.e., V, Nb, Ta, As, Sb or Bi) | 339 | ...Of palladium or platinum |
| 312 |Vanadium containing | 340 | ..Of Group II (i.e., alkaline earth, Be, Mg, Zn, Cd or Hg) |
| 313 | ...And Group VIII metal containing (i.e., iron or platinum group) | 341 | ...And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 314 |Iron group metal and Group III metal containing (i.e., Fe, Co or Ni and Sc, Y, Al, Ga, In or Tl) | 342 |Of zinc |
| 315 |Nickel containing | 343 | ...Of zinc |
| 316 |Iron containing | 344 | ..Of Group I (i.e., alkali, Ag, Au or Cu) |
| 317 | ...And Group I containing (i.e., alkali, Ag, Au or Cu) | 345 | ...Of copper |
| 318 |Copper containing | 346 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 319 | ...Of chromium | 347 | ...Of silver |
| 320 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) | 348 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 321 | ...Of molybdenum | 349 | ..Of Group IV (i.e., Ti, Zr, Hf, Ge, Sn or Pb) |
| 322 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) | 350 | ...Of titanium |
| 323 | ...And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) | 351 |And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| 324 | ..Of manganese | 352 | ...Of tin |
| 325 | ..Of Group VIII (i.e., iron or platinum group) | 353 | ..Of Group V (i.e., V, Nb, Ta, As, Sb or Bi) |
| 326 | ...Of platinum group metal and of iron group (i.e., Ru, Rh, Pd, Os, Ir, or Pt and Fe, Co or Ni) | 354 | ...And Group III metal containing (i.e., Sc, Y, Al, Ga, In or Tl) |
| | | 355 | ..Of Group III (i.e., Sc, Y, Al, Ga, In or Tl) |
| | | 400 | SOLID SORBENT |
| | | 401 | ..Organic |
| | | 402 | ..Synthetic resin |
| | | 403 | ..Protein |
| | | 404 | ..Carbohydrate |
| | | 405 | ..Inorganic gel containing (e.g., silicagel) |

406 .Having specifically intended
extraneously added iron group
(i.e., Fe, Co, Ni) component

407 .Silicon containing

408 ..Acid treated

409 ..Quartz

410 ..Magnesium silicate (e.g.,
abestos, vermiculite, etc.)

411 ..Having extraneously added
alkali metal, or alkaline
earth metal

412 ..Diatomaceous earth

413 ..Free carbon containing

414 .Aluminum containing

415 ..Alumina (i.e., dialuminum
trioxide)

416 .Free carbon containing

417 ..And specified adde active
sorbent material

418 ..Process utilizing solid or
liquid source carbonizable
material, or product thereof

419 ...Producing diverse useful
byproduct

420 ...Temperature vs. time factor

421 ...Including recycling product or
intermediate thereof to prior
stage of process

422 ...Including diverting part of
source to provide fuel for
process

423 ...Adding nongaseous inorganic,
or inorganic yielding
component, prior to or during
process

424Zinc containing

425Phosphorus containing

426Acid

427Alkali metal, alkaline earth
metal, or magnesium containing

428 ...Including pelletizing or
briquetting and subsequently
comminuting

429Using carbonaceous binder

430 ...Treating with gas

431Fluidized bed having
specified parameter

432Specified atmosphere

433Including free oxygen

434And subsequent diverse gas

435Exposure to hot flue or
exhaust gas

436 ...Diverse temperatures

437 ...Specified source (e.g., peach
pit, etc.)

438 ..Chemically reducing an oxide or
product thereof

439 **MISCELLANEOUS (E.G., CARRIER OR
SUPPORT PER SE OR PROCESS OF
MAKING, ETC.)**

CROSS-REFERENCE ART COLLECTIONS

500 **STABILIZED**

501 .For multi-regenerability

502 .Cystallinity

503 .Crush strength

504 .Abrasion resistance

506 **METHOD OF MAKING INORGANIC
COMPOSITION UTILIZING ORGANIC
COMPOUND (EXCEPT FORMIC,
ACETIC, OR OXALIC ACID OR SALT
THEREOF)**

507 .Synthetic resin, natural resin,
polysaccharide, or polypeptide

508 .Sulfur containing organic
compound

509 .Nitrogen containing organic
compound

510 ..Also containing hydroxyl bonded
to carbon, e.g., carboxylic
acid, etc.

511 ..Two or more nitrogen atoms
bonded to different carbon
atoms

512 .Carboxylic acid or salt thereof
other than formic, acetic, or
oxalic acid

513 .Alcohol, phenol, or ether or
metallate thereof

514 **PROCESS APPLICABLE EITHER TO
PREPARING OR TO REGENERATING
OR TO REHABILITATING CATALYST
OR SORBENT**

515 **SPECIFIC CONTAMINANT REMOVAL**

516 .Metal contaminant removal

517 .Sulfur or sulfur compound
removal

518 .Carbonaceous contaminant

519 **REAGENT GRADE (E.G., ULTRA PURE)**

520 **SUPPRESSED SIDE REACTIONS**

521 **METAL CONTAMINANT PASSIVATION**

522 **RADIANT OR WAVE ENERGY ACTIVATED**

523 **MISCELLANEOUS SPECIFIC TECHNIQUES
OF GENERAL APPLICABILITY**

524 **SPINEL**

525 **PEROVSKITE**

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| 526 | SORBENT FOR FLUID STORAGE, OTHER THAN AN ALLOY FOR HYDROGEN STORAGE | <u>FOREIGN ART COLLECTIONS</u> |
| 527.11 | MONOLITH OF PECULIAR STRUCTURE OR PHYSICAL FORM, WITH SPECIFIED HEAT EXCHANGE CAPABILITY | FOR 000 CLASS-RELATED FOREIGN DOCUMENTS |
| 527.12 | PLURAL LAYERS ON A SUPPORT, EACH LAYER HAVING A DISTINCT FUNCTION | |
| 527.13 | .More than two overlapping layers | |
| 527.14 | SPECIFIED SUPPORT PARTICLES OF PECULIAR STRUCTURE OR PHYSICAL FORM (E.G., WHISKERS, FIBER PIECES, ETC.) | |
| 527.15 | .Layered deposition on support particle (i.e., on a carrier particle) | |
| 527.16 | .Specified shape of support particle (e.g., hollow-carrier particle) | |
| 527.17 | .Specified cross-section shape or area of elongated support particles (e.g., tape, with area of cross section stated) | |
| 527.18 | MONOLITH WITH SPECIFIED GAS FLOW PATTERNS (E.G., TURBULENT FLOW MONOLITH) | |
| 527.19 | MONOLITH WITH SPECIFIED SHAPE OR DIMENSION OF CELL OPENING (E.G., HONEYCOMB, RINGS, ETC.) | |
| 527.2 | .Cell opening shape and dimensions are determined by the intersection of the woof and the warp of a woven structure (e.g., of a fabric or gauze, etc.) | |
| 527.21 | .Cell openings are quadrilateral or triangular (e.g., pie shaped) | |
| 527.22 | .Cell openings are spiral or corrugated | |
| 527.23 | SPECIFIED EXTERNAL OR INTERNAL SHAPE OR CONFIGURATION OF CATALYST REACTOR OR OF SORBENT CONVERTER | |
| 527.24 | PECULIAR STRUCTURE OR PHYSICAL FORM (E.G., FOAM, SPONGE, FOIL, SACK, BAG, FIBER IN A MATRIX, MONOLITH, MICROSTRUCTURE (MICROCRACKING), MICROAGGREGATES, ETC.) | |

